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# HOW TO KILL AND BLEED MARKET POULTRY.[1]

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[With an added section on "A Knife for Killing Poultry," by H. C. Pierce, Food Research Laboratory.]

## INTRODUCTION.

The problem of getting poultry to market in first-class condition, as determined by its appearance, flavor, and "keeping quality," is no longer the comparatively simple proposition that the farmer or poultry dresser found it in the days when cities were smaller and could draw upon their environs for a large share of the poultry which they consumed. At the present time the quantities of perishable foodstuffs of all kinds required by the cities are so great that their immediate vicinity can not supply the demand. Neither do the various parts of the country endeavor at the present time to supply either the quantity or the variety of perishable foods consumed in them, because economic conditions have made it advisable for certain sections of the country, especially adapted to the production of certain kinds of crops, to raise these in much larger amounts than are needed for home consumption, and to send the surplus to the sections of nonproduction, or where a shortage prevails. Such a condition of affairs has led to the lengthening of the period between production and consumption. In order, therefore, that perishable produce shall still reach the market in good condition, it must be handled in such wise that deterioration will be checked as far as possible. To accomplish this there have been developed railroad refrigerator cars, fast freights, cold-storage warehouses, and all that vast and complicated system on which depends the feeding of our populace the year round and the equalization of seasonal and regional overproduction. In spite of this system, however, if care of the product at the source of production is lacking, deterioration will occur before the product reaches the consumer. The California orange must be cut from the tree carefully and handled carefully if it is to travel with safety from the Pacific States to the consumer in New York. The Oregon raspberry must be picked at the proper stage of develop-

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ment and then kept cool if it is to be enjoyed by the people in Minneapolis and St. Paul. The meat raised on our western prairies must be properly slaughtered, chilled, and maintained in a chilled condition if it is to feed the people of London.

Just so it is with dressed poultry. If it is to reach the consumer with the best of flavor and wholesomeness, the most attractive appearance, and in the best possible state of preservation, it must be properly raised, killed, and dressed. Granting that the chicken has been bred and fed to be a good eating chicken and that it is ready for slaughter, the first step in the preservation of its good qualities is to starve it for twenty-four hours, allowing, however, a liberal supply of fresh, clean water during this period. The intestines of the bird having been emptied of food, the next step in the dressing of market poultry is the proper killing and bleeding of the fowl, and it is with this question that the present publication is chiefly concerned.

## EVIDENCES OF BAD BLEEDING.

A very large proportion of the unsightly poultry in our markets, aside from the rubbing and tearing of the skins, is caused by an incomplete removal of the blood. This is evidenced by red dots which frequently occur where the feathers have been removed, especially over the thighs and wings; or by the small veins which are seen over the breast and in the angles of the wings, or larger veins, which mar the appearance of the neck. Generally it is the neck which shows most plainly the presence of blood in the fowl, or that a wrong method has been used in cutting the blood vessels in an attempt to empty them. The neck is the first part to discolor, becoming first red, then bluish red or purple, and finally green as aging progresses. Often there are discolored areas on the sides of the neck close to the head which look like bruises. These are commonly caused by the killer holding the neck of the bird when cutting the veins, and thereby preventing the blood from escaping. This question is so important, however, that it will be considered in detail later on. Not only are the results of bad bleeding observed in certain parts of the body, but the clear, bright color of the flesh for which every poultry dresser tries is never at its best unless the blood has been completely drained out.

## MARKET LOSS DUE TO BAD BLEEDING.

At least 30 per cent of all the poultry coming into the New York market is incompletely bled. Much of it is so badly bled that it results in a loss of from 2 to 5 cents a pound, as compared with the corresponding poultry which is well bled and in good order. Aside from the bad appearance of incompletely bled chickens, their keeping

properties are very inferior. The flesh loses its firmness sooner; its flavor is not so good; the odor of stale flesh and finally of putrefaction comes sooner; and in every way the product is more perishable.

### KEEPING QUALITY OF WELL AND BADLY BLED CHICKENS.

A very careful study is now being made in this laboratory of the comparative periods of time that well and badly bled chickens will keep. This is being determined for every phase of their marketing—their condition after chilling in the packing house; when they reach the end of their railroad haul; and when they have passed through the various channels of a large city to the consumer. The time required for such a study makes it impossible to give the results of the work in detail at present. Certain salient points, however, stand out with such sharpness that it seems advisable to report them in a summarized form, that those who are engaged in the dressing and handling of poultry may be able to profit by them at once.

### STUDY OF BLOOD VESSELS OF NECK AND HEAD.

An anatomical study of the blood vessels of the head and neck of the chicken has been included in the investigation of the handling and marketing of dressed poultry in order to determine the best methods of bleeding and the reasons for the incomplete bleeding which is so prevalent. Heretofore there has been no description available of the number and location of the large veins in the neck of a chicken. This lack of knowledge has resulted in much indiscriminate hacking and gashing of the chicken's mouth, all of which is frequently done to no purpose, because in spite of the many cuts the large veins which carry the blood often are not touched.

### "CUTTING" TO BLEED AND "STICKING" TO BRAIN.

When the feathers are removed by scalding, the bird is killed by bleeding alone, hence the cuts to sever the veins are the only ones attempted, and if the attempt fails bad bleeding will surely result. If, on the other hand, dry picking is to be practiced, the birds are cut to bleed and are also stuck through the brain to paralyze the feather muscles. The latter operation is sometimes performed by running the knife under the eye at such an angle that its point will touch the skull midway between the eyes and a little behind them; or the braining is accomplished by placing the knife about halfway down the groove in the roof of the chicken's mouth, and then thrusting it up until the knife reaches the top of the skull. The knife, as in sticking under the eye, should touch the brain in the back part of the skull. The point of the knife should then be twisted slightly, so that enough brain tissue may be destroyed to paralyze the bird and cause the feathers to loosen. If the "outside-stick" method is practiced, practically no blood escapes. If, on the other hand, braining

inside of the mouth is adopted, the blood vessels in the brain which are cut find an outlet for their contents through the knife hole. Bleeding from these vessels is, under any circumstances, of assistance in obtaining the best results, and where the neck vessels are missed the condition of the chicken is often greatly improved by the bleeding from the brain.

FIG. 1.—External view of head and neck, showing position of veins.

## DISCUSSION OF THE ILLUSTRATIONS.

### LOCATION OF VEINS.

The location of the principal veins in the neck of the chicken, their relation to the skull, and the point at which it is desirable to make the cut for bleeding, are shown in the accompanying illustrations. Figure 1 shows the head and neck of a young cock about a year old. Two large veins (heavily lined with black in the figure) run the whole length of the neck, one on each side, and unite by a "bridge-vein" which is just below and behind the ear. This vein, which connects the two others, does not run straight across but at an angle, so that it is farther front on the right than on the left side. If the feathers on the neck of a chicken are pushed aside, or, better still, if a molting chicken with but a few feathers is observed, these veins can be seen at each side of the neck while the bird is alive, especially if a little pressure is used at the lower part of the neck so that the blood collects and distends them. It is important that the position of these veins be exactly located on the neck of the live bird, since upon this infor-

mation will depend very largely the proper guiding of the knife to the blood vessel.

Figure 2 shows two sketches of a chicken's head from which the lower jaw has been removed. The lower jaw of the chicken is much longer than the beak. It runs back to a point just below the ear, where the hinged joint can be felt. The skin which makes the corner of the mouth and limits the length of the beak ends is indicated in the anatomical drawing marked "A." The skin and lower jaw have been cut away in order that the position of the veins which lie far back on the roof of the mouth and just below its surface may be seen. The groove which occurs in the roof of the chicken's mouth is a guide to the position of the blood vessel which it is desirable to cut, this point being behind and to the left of the end of the groove when the chicken is held head down and with the lower side of the head uppermost. The direction and position of the cut which is to sever the veins is shown in figure 2 to be on the left side of the chicken's head when in the position just described. Because the short blood vessel connecting the two long veins, which we have termed the "bridge," does not run straight but at an angle, the point just indicated is farthest front and the most easily reached by the knife. As stated before, these veins lie just below the skin of the roof of the mouth, hence a deep cut is not needed, neither is any amount of strength required for the operation.

It will be observed that just in front of the line which indicates the point at which these veins are to be cut they divide into two small branches, the course of which is not further shown. This is because they very soon pass through small holes in the bone and go into the inside of the skull, and into the deep tissue, where they are quite safe from the killer's knife. If, then, these large veins are to be severed, the cut must be made far enough back to reach them before they penetrate the bones of the skull. On the other hand, if the cut is made too far back and over the edge of the skull, as will be discussed in connection with figure 2, B, much of the blood will settle in the loose tissue of the neck instead of running out of the mouth, thereby clogging the vessels and preventing complete bleeding, as well as making unsightly discolored areas on the neck near the head. It is better to make one cut as shown in this plate rather than to cut the "bridge" in the middle or to cut each side vein separately, since this sometimes results in the clotting of the blood at the ends of the veins before the bleeding is completed.

### ANATOMY OF THE SKULL.

From what has been said concerning the necessity of cutting far back in order to reach the point desired, it will be seen that it is necessary to know something of the position and shape of the bones

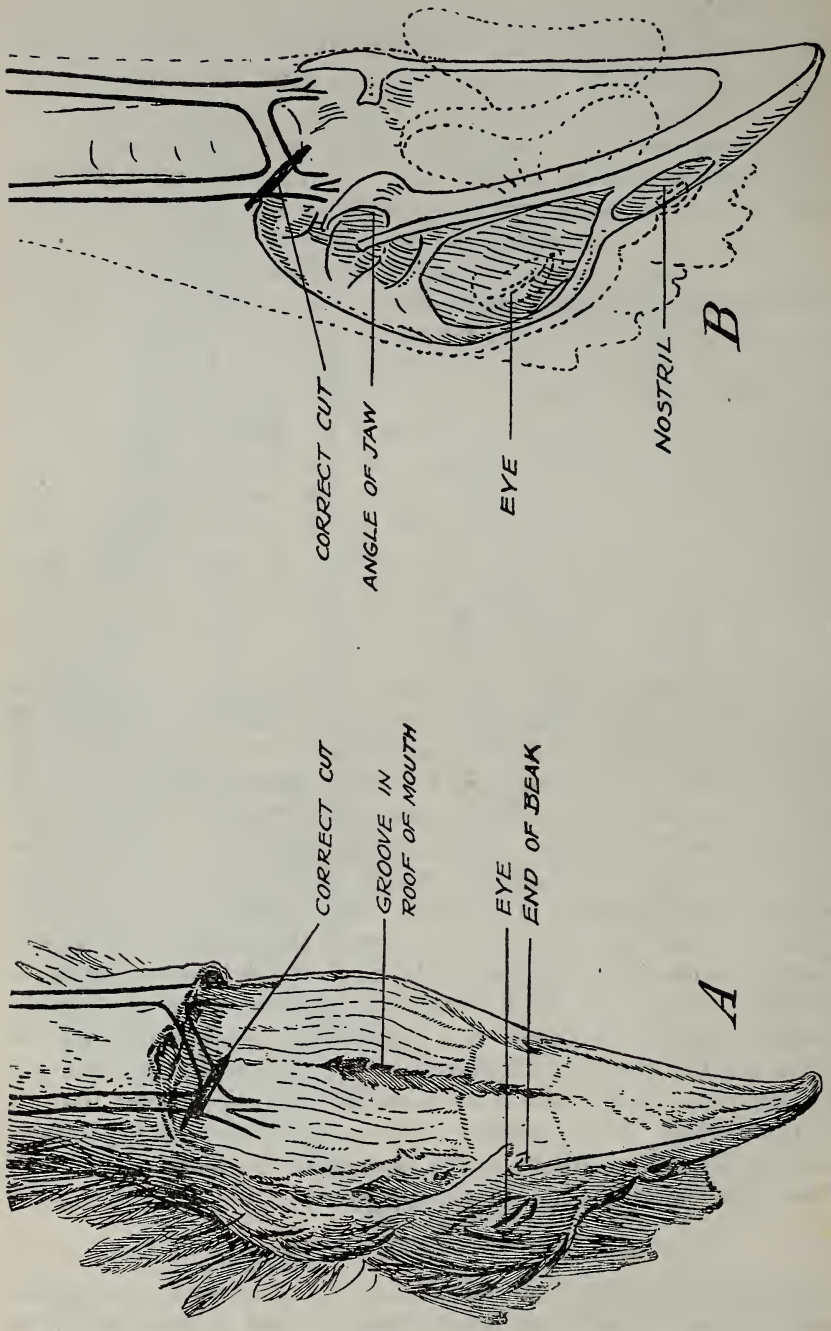


FIG. 2.—Lower jaw removed, showing position of veins, anatomy of skull, and location of cut.

of the chicken's skull and their relation to the external parts of the head. This information is given in figure 2, B. Dotted lines around the drawing of the skull show the position of wattles, comb, etc. In this sketch, too, is shown clearly the length of the chicken's jaw, as before mentioned. Its hinge will be found on the head of the live bird just below the ear. Still farther back there is a U-shaped depression in the skull into which fits the upper part of the spinal column. The spine is not shown in the sketch, but the bridge vein connecting the two large veins of the neck lies directly across the U-shaped depression.

It can be seen by studying this drawing how far back the knife must go if the veins are to be cut at the angle, and it will also be observed that when they are cut in this position the knife will have a bony backing which will prevent it from going too deep, thereby obviating the spongy mass of blood in the neck tissues which was discussed in connection with figure 2, A. This illustration also shows where the fingers can grasp the head of the chicken firmly and yet not press against the soft parts of the neck. Just above the angle of the jaw—that is, about at the chicken's ear—there is a smooth, strong area of bone large enough to support the thumb on one side and the forefinger on the other, and this is where the head should be held while killing.

### POSITION OF HAND AND KNIFE.

Figure 3 shows the position of a chicken ready for killing and held by the feet in a U-shaped shackle. Notice that the thumb of the killer is pressed firmly down on the head just below and behind the ear in the space to which attention was called when discussing the bones of the skull. Here, too, is the hinge of the jaw. Pressure of the thumb on one side of this portion of the skull and on the other side at the same place with the forefinger, or with the forefinger and second finger, will result in opening the chicken's mouth and holding it open while the operator makes the cut to bleed. Held in such fashion, there is nothing to constrict the blood vessels, thereby preventing the blood from escaping even though these vessels be cut. The pressure against the jaw makes accurate cutting of the veins easier, since the bird can not close its mouth until the pressure is removed. Of course, care must be taken not to stretch the neck unduly, else the vessels will be pulled to such a narrow diameter that they are more difficult to find and also more difficult to empty.

The position of the knife in the mouth, which is shown by the dotted line, needs no further explanation. The knife itself, however, is very different from that ordinarily used in the bleeding of chickens. The knife in common use is much too large, both too

long and too broad for the most successful work. Generally it is provided with a heavy handle, large enough to be grasped easily by a large, strong hand. As has already been observed in this discussion, the heavy slashing inside the bird's mouth is not only frequently futile so far as cutting the veins goes, but is really harmful in that it makes a pathway for the entrance of bacteria and the consequent hastening of the bird's decomposition. The operation calls for accuracy rather than for strength, and therefore it is desirable that the knife should have a smaller handle, which can not be gripped so hard. The blade of the knife should be about 2 inches long and

FIG. 3.—Correct grasp of head at angle of jaw and position of small knife when cutting vein.

one-fourth of an inch wide and of a heavy piece of steel, so that it will not bend. It is advisable, therefore, to have the back of the blade about one-sixteenth of an inch thick. It should be made of good hard steel and ground to a sharp point with a straight cutting edge, the slope for the point being taken from the back rather than from the edge. The working space in the back part of the mouth of the chicken where the blood vessels lie is very small. Often the knife which is used by the killer is too broad to go into this space without cutting the sides of the mouth, and as for turning and guiding it, that is quite out of the question.

EXAMPLES OF BAD CUTTING.

Ineffectual cutting, due to lack of knowledge of the structure of the chicken's neck and head, the use of force rather than skill on the part of the operator, and a knife ill adapted to the work which it has to do, is illustrated in figures 4 and 5 which show some of the most common types of cuts in badly bled chickens. A study of these illus-

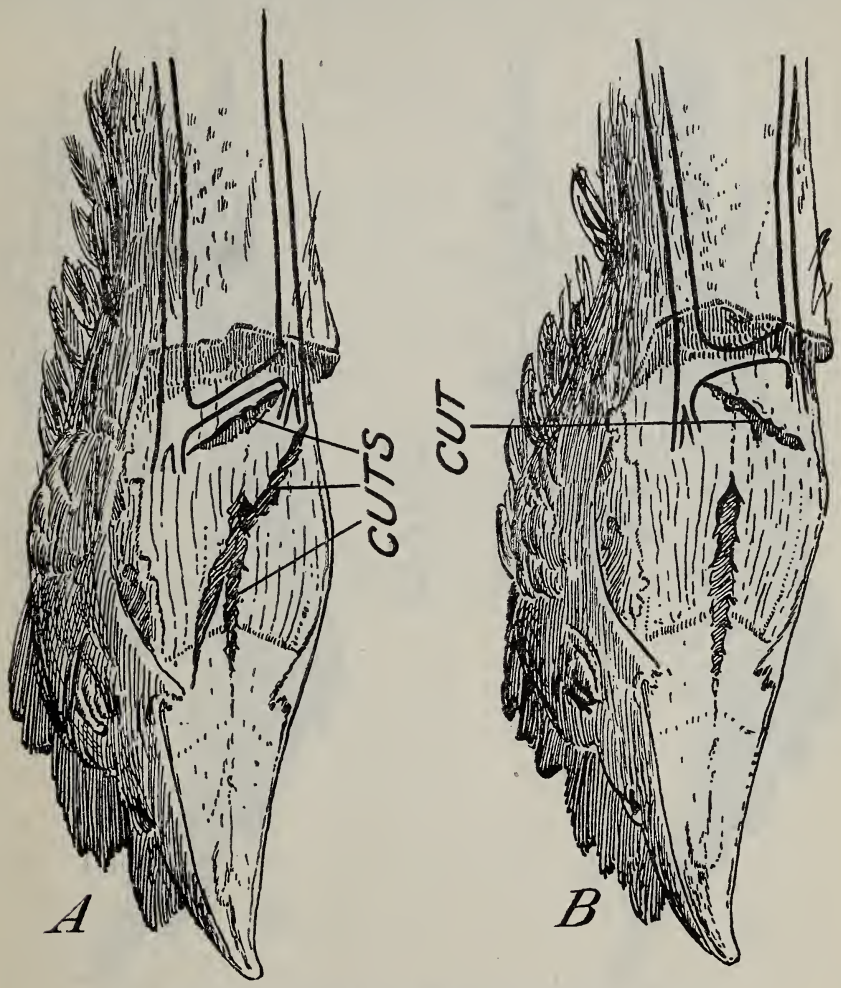


FIG. 4.—Location of cuts in mouths of badly bled chickens (lower jaw removed).

trations indicates very plainly why these chickens are badly bled. The lower jaws from these heads were removed so that the position of the cuts could be noted. Head A has had two cuts. One has run parallel with the connection between the two veins and very close to it but has not cut it, and another has run from the angle of the mouth to close to the point where the blood vessel on the left side

of the head breaks into the two smaller vessels and penetrates the bones of the skull. The only vessels which were cut in this chicken were the small superficial veins supplying the roof of the mouth and from which the bleeding amounted to almost nothing. Head B shows a cut in the right direction but it did not go quite far enough back to reach the veins at their junction. Head A, in figure 5, shows

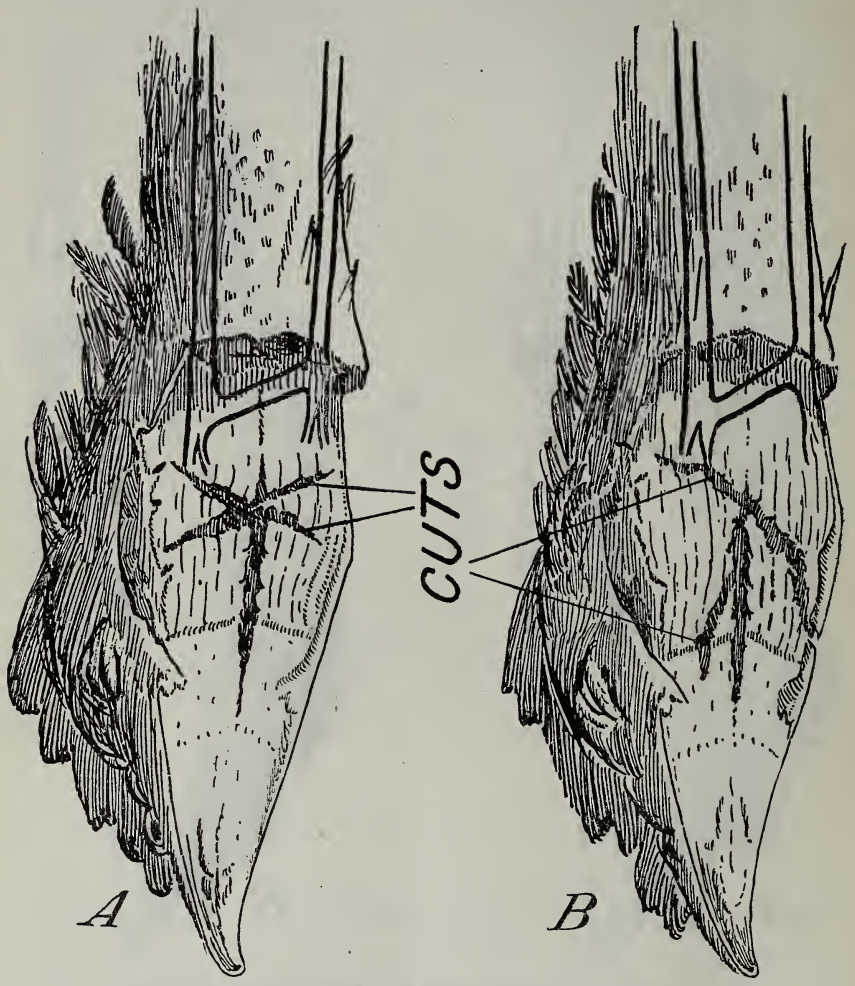


FIG. 5.—Attempts at "cross cutting," showing veins untouched.

the cross cut which is advocated by so many killers. In this case it was made too far front. Both of the large veins escaped and only the small vessels of the roof of the mouth were disturbed. "B" is a good illustration of indiscriminate cutting by a badly directed knife, which in all probability was far too large, since the upper cut extends all the way across the roof of the chicken's mouth and almost as far

front as the beak. Another cut which partly follows the groove in the roof of the mouth would indicate that the killer had tried to make a cross cut.

Such examples of bad cutting might be multiplied indefinitely. Yet the general principle is the same and the result is the same—namely, a fowl which is not completely bled, which is unsightly, even in the packing house, and which deteriorates as a food stuff more rapidly than does the well-bled chicken under similar conditions.

## SUMMARY.

The facts which have been stated in the foregoing pages may be summarized as follows:

(1) Grasp the chicken when killing by the bony part of the skull. Do not let the fingers touch the neck.

(2) Make a small cut inside the mouth on the right side of the throat just where the bones of the skull end, using a narrow-bladed sharp-pointed knife. The direction of the knife is upward and toward the left when the bird is held head downward with the throat toward the operator while killing.

(3) Brain for dry picking by thrusting the knife through the groove which runs along the middle line of the roof of the mouth until it pierces the brain in the back part of the skull, causing a loosening of the feathers.

(4) For chickens use a knife the blade of which is 2 inches long, one-fourth inch wide, with a thin, flat handle, a sharp point, and a straight cutting edge. For turkeys the blade may be $2\frac{1}{2}$ inches long. Keep knives very sharp.

## A KNIFE FOR KILLING POULTRY.[1]

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The knives in common use in bleeding and braining poultry are not suited to their purpose. The blades are too broad and too long and the curve at the point should be on the back instead of on the cutting edge. The handle is so large that the killer is encouraged to use too much force in making the cut to bleed, whereas a light touch of the sharp knife, properly directed, is all that is needed to cut the blood vessels. The knives are also insanitary in that dirt collects at the junction of the blade and handle.

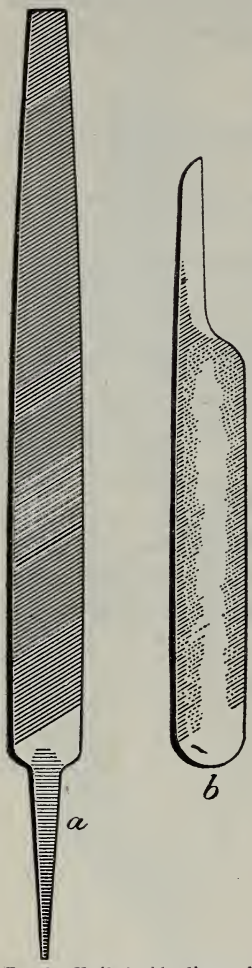


FIG. 6.—Knife for bleeding and braining poultry: *a*, File from which knife was made; *b*, knife.

The knife which is to be used to bleed and brain poultry should be small, with a narrow blade; stiff, so that it does not bend; of the best steel, so that it can be kept sharp and is not nicked when used in braining; and the handle and blade should be in one piece. Such a knife, with the aid of the packing-house emery wheel or grindstone and oilstone, can be made from an 8-inch flat file. (See fig. 6, *a*.)

To make this knife the blade should be shaped from the small end of the file, as shown in figure 6, *b*. It should be, for chickens, 2 inches long, one-fourth inch wide, and one-sixteenth inch thick at the back. For turkeys the blade should be 2½ inches long. The curve to make the point should slope from the back downward. A blade of this shape reaches the blood vessels to be cut more surely than does a blade on which the point curves upward. After the blade is made the ridges on the file should be ground down, leaving just enough roughness to prevent the knife slipping in the hand of the killer. The handle should be 5 inches long.

[1] Originally issued as an independent leaflet, under date of June 22, 1910.

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